**THAT WHICH IS CLAIMED:**

1. A catalyst system comprising an ionic liquid dispersed on a support having an average pore diameter greater than about 225 Å.

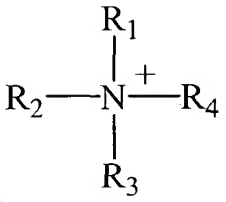
2. A catalyst system in accordance with claim 1 wherein said support has a surface area less than about 700 $m^2$/gram.

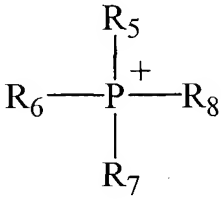
3. A catalyst system in accordance with claim 1 wherein said support is non-crystalline.

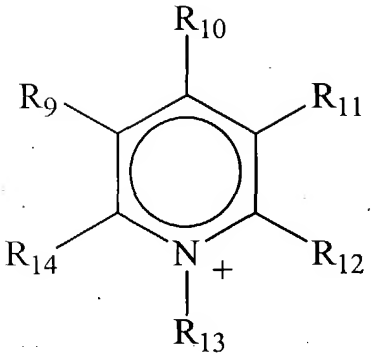
4. A catalyst system in accordance with claim 1 wherein said support is non-crystalline and has a surface area less than about 700 $m^2$/gram.

5. A catalyst system in accordance with claim 1 wherein said support is silica.

6. A catalyst system in accordance with claim 1 wherein said ionic liquid comprises a cation and an anion; wherein said cation is selected from the group consisting of ions defined by the formulas:



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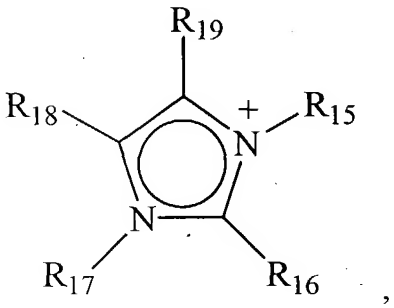


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and combinations of any two or more thereof, wherein:

$R_1$, $R_2$, $R_3$, $R_5$, $R_6$, and $R_7$ are selected from saturated and unsaturated hydrocarbons containing from 1 to 7 carbon atoms per molecule;

$R_4$, $R_8$, $R_9$, $R_{10}$, $R_{11}$, $R_{12}$, $R_{13}$, $R_{14}$, $R_{15}$, $R_{16}$, $R_{17}$, $R_{18}$, and $R_{19}$ are selected from saturated and unsaturated hydrocarbons containing from 1 to 7 carbon atoms per molecule, and hydrogen; and

wherein said anion is selected from the group consisting of halides of: Group IIIA metals, copper, zinc, iron and phosphorus.

7. A catalyst system in accordance with claim 6 wherein said anion is selected from the group consisting of $AlCl_4^-$, $Al_2Cl_7^-$, $Al_3Cl_{10}^-$, $GaCl_4^-$, $Ga_2Cl_7^-$, $Ga_3Cl_{10}^-$, $CuCl_2^-$, $Cu_2Cl_3^-$, $Cu_3Cl_4^-$, $ZnCl_3^-$, $FeCl_3^-$, $FeCl_4^-$, $Fe_3Cl_7^-$, $PF_6^-$, and $BF_4^-$.

8. A catalyst system in accordance with claim 6 wherein said ionic liquid has the formula $R_1R_2R_3NH^+Al_2Cl_7^-$.

9. A catalyst system in accordance with claim 6 wherein said ionic liquid has the formula $(CH_3)_3NH^+Al_2Cl_7^-$.

10. A catalyst system in accordance with claim 1 wherein a Group VIII metal compound is dispersed in said ionic liquid.

11. A catalyst system in accordance with claim 10 wherein said Group VIII metal compound comprises a platinum compound.

12. A process comprising:

a) contacting, under conversion conditions, a hydrocarbon feed stream comprising a $C_5$ paraffin and an initiator with a catalyst system comprising an ionic liquid dispersed on a support; and

b) withdrawing a product stream comprising a $C_4$ paraffin and at least one $C_6$ paraffin.

13. A process in accordance with claim 12 wherein said support has an average pore diameter greater than about 225 Å.

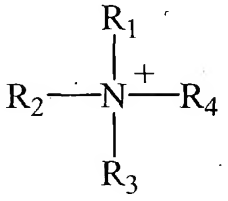
14. A process in accordance with claim 12 wherein said support has a surface area less than about 700 $m^2$/gram.

15. A process in accordance with claim 12 wherein said support is non-crystalline.

16. A process in accordance with claim 12 wherein said support is non-crystalline, has an average pore diameter greater than about 225 Å, and has a surface area less than about 700 $m^2$/gram.

17. A process in accordance with claim 12 wherein said support is silica.

18. A process in accordance with claim 12 wherein said ionic liquid comprises a cation and an anion; wherein said cation is selected from the group consisting of ions defined by the formulas:

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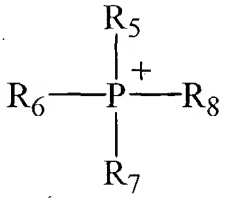


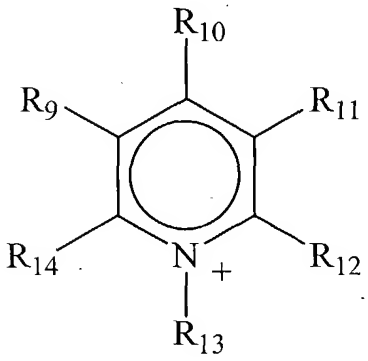


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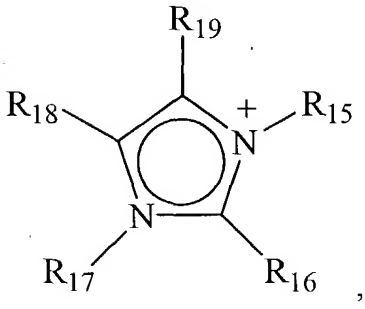


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and combinations of any two or more thereof, wherein:

$R_1$, $R_2$, $R_3$, $R_5$, $R_6$, and $R_7$ are selected from saturated and unsaturated hydrocarbons containing from 1 to 7 carbon atoms per molecule;

$R_4$, $R_8$, $R_9$, $R_{10}$, $R_{11}$, $R_{12}$, $R_{13}$, $R_{14}$, $R_{15}$, $R_{16}$, $R_{17}$, $R_{18}$, and $R_{19}$ are selected from saturated and unsaturated hydrocarbons containing from 1 to 7 carbon atoms per molecule, and hydrogen; and

wherein said anion is selected from the group consisting of halides of: Group IIIA metals, copper, zinc, iron and phosphorus.

19. A process in accordance with claim 18 wherein said anion is selected from the groups consisting of $AlCl_4^-$, $Al_2Cl_7^-$, $Al_3Cl_{10}^-$, $GaCl_4^-$, $Ga_2Cl_7^-$, $Ga_3Cl_{10}^-$, $CuCl_2^-$, $Cu_2Cl_3^-$, $Cu_3Cl_4^-$, $ZnCl_3^-$, $FeCl_3^-$, $FeCl_4^-$, $Fe_3Cl_7^-$, $PF_6^-$, and $BF_4^-$.

20. A process in accordance with claim 18 wherein said ionic liquid has the formula $R_1R_2R_3NH^+Al_2Cl_7^-$.

21. A process in accordance with claim 18 wherein said ionic liquid has the formula $(CH_3)_3NH^+Al_2Cl_7^-$.

22. A process in accordance with claim 12 wherein said hydrocarbon feed stream comprises at least 50 weight-% isopentane, based on the total weight of said hydrocarbon feed stream.

23. A process in accordance with claim 12 wherein said hydrocarbon feed stream comprises in the range of from about 50 to about 95 weight-% isopentane, based on the total weight of said hydrocarbon feed stream.

24. A process in accordance with claim 12 wherein said hydrocarbon feed stream comprises in the range of from about 80 to about 98.5 weight-% isopentane, based on the total weight of said hydrocarbon feed stream.

25. A process in accordance with claim 12 wherein said conversion conditions include a temperature in the range of from about 100°F to about 1000°F.

26. A process in accordance with claim 12 wherein said conversion conditions include a temperature in the range of from about 140°F to about 250°F.

27. A process in accordance with claim 12 wherein said conversion conditions include a temperature in the range of from about 150°F to about 220°F.

28. A process in accordance with claim 12 wherein said $C_4$ paraffin of said product stream is isobutane and said $C_6$ paraffin of said product stream is a hexane isomer.

29. A process in accordance with claim 12 wherein said initiator is selected from the group consisting of: 1) an olefin having in the range of from 2 to 20 carbon atoms per molecule, 2) an alkyl halide wherein said alkyl halide has in the range of from 2 to 20 carbon atoms per molecule, and combinations thereof.